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10/717,522	11/21/2003	Nobuhiro Asai	019970-009	8414

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HOFFBERG, ROBERT JOSEPH	
ART UNIT	**PAPER NUMBER**
2835	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/717,522	ASAI ET AL.	
	Examiner	Art Unit	
	Robert J. Hoffberg	2835	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 February 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4-8 and 14-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4-8 and 14-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Detailed Action

Claim Objections

Claim 16 is objected to because of the following informalities: "the first and second projection" lacks antecedent basis. For examination purposes, the projections are interpreted as the first and second protrusions. Appropriate correction is required.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shin et al. (US 6,275,374), in view of Gohl et al. (US 4,945,451).

With respect to Claim 1, Shin et al. teaches a heat-dissipation device for dissipating heat produced by at least one electronic component (Fig. 2, #24) of an electronic control device (Fig. 2, #100), wherein the electronic control device includes a circuit board (Fig. 2, #30) having the electronic component mounted thereon, and a protective case (Fig. 2, #84) substantially confining the circuit board, the heat dissipation device comprising: a heat conductive terminal (Fig. 2, #42) connected to the circuit board in a position proximate (see Fig. 2) to the electronic component, so that the heat (Col. 6, lines 44-45) of the electronic component is transferred or conducted to the heat conductive terminal; wherein

the heat conductive terminal comprises: a first end portion (Fig. 2, #42 bottom) connected to the protective case in order to thermally conduct the heat to the protective case; and a second end portion (Fig. 2, #42 middle) inserted into an insertion hole (Fig. 2, #30 for #42) formed in the circuit board so as to be connected to an inner wall (see Fig. 2) of the insertion hole. Shin et al. fails to teach a first and second heat conductive layers on or within the circuit board. Gohl et al. teaches a first heat conductive layer (Fig. 3, #23) formed on the inner wall of the insertion hole (Fig. 3, #22), and at least one second heat conductive layer (Fig. 2, #24) disposed on or within the circuit board (Fig. 1, #10) and connected to the first heat-conductive layer so that the heat conducted or transmitted from the electronic component (Fig. 2, #17) to the at least one second heat conductive layer (Fig. 2, #24) and connected to the first conductive layer (Fig. 2, #23) and is further conducted to the heat conductive terminal (Fig. 2, #21). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the device of Shin et al. with that of Gohl et al. for the purpose of providing a circuit board with heat conductive layers having a continuous conductive path to maximize heat dissipation from the electronic component to the heat conductive terminal.

With respect to Claim 4, Shin et al. does not teach that the second end portion of the heat conductive terminal is connected to the first heat conductive layer by a soldered portion. Gohl et al. further teaches wherein the second end portion (Fig. 2, #21) of the heat conductive terminal (Fig. 2, #S) is connected to the first heat conductive layer by a soldered (Col. 3, line 7) portion. It would

have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat-dissipating device of Shin et al. with that of Brown by using solder as a means to couple the circuit board and the terminal.

3. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shin et al. (US 6,275,374), in view of Gohl et al. (US 4,945,451) and further in view of Brown (US 4,729,061)

With respect to Claim 5, Shin et al. in view of Gohl et al. do not teach heat conductive layers on a top surface, the intermediate region and bottom surface of the circuit board. Brown further teaches wherein the at least one second heat conductive layer includes a top (Fig. 10, #112) heat conductive layer, at least one intermediate (Fig. 10, #132) heat conductive layer, and a bottom (Fig. 10, #134) heat conductive layer, that are disposed on a top surface, an intermediate region (Fig. 10, #130), and a bottom surface (Fig. 10, #136) of the circuit board, respectively. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat-dissipating device of Shin et al. in view of Gohl et al. with that of Brown by using multiple heat conductor layers to increase the thermal dissipation.

With respect to Claim 6, Shin et al. in view of Gohl et al. do not teach a first electrical layer and a plurality of second electrically conductive layers on the top surface, the intermediate region and bottom surface of the circuit board. Brown further teaches wherein the circuit board further having at least one through hole (Fig. 10, #160) formed in the circuit board extending throughout the thickness of the circuit board and disposed in close proximity (see Fig. 10) to the

electronic component, additionally includes: a first electrical conductive layer (Fig. 1, #160 and Col. 2, lines 17-22) formed on an inner wall of the through-hole (Fig. 4, #203); and a plurality of second electrically conductive layers including a top (Fig. 10, #112 and Col. 4, line 68 layer can be both electrical and thermal) electrically conductive layer, at least one intermediate (Fig. 10, #132 and Col. 4, line 68 layer can be both electrical and thermal) electrically conductive layer, and a bottom (Fig. 10, #134 and Col. 4, line 68 layer can be both electrical and thermal) electrically conductive layer that are disposed on a top surface, an intermediate region (Fig. 10, #130), and a bottom surface (Fig. 10, #136) of the circuit board, respectively, wherein at least two of the second electrical conductive layers are connected (see Fig. 10) to each other via the first electrically conductive layer. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat-dissipating device of Shin et al. in view of Gohl et al. with that of Brown to couple multiple heat conductor layers to the heat pipe in the through hole to increase the thermal dissipation.

With respect to Claim 7, Shin et al. in view of Gohl et al. do not teach that the top, intermediate and bottom electrically conductive layers are connected. Brown further teaches wherein the top (Fig. 10, #112) electrically conductive layer is connected to at least one of the intermediate (Fig. 10, #132) electrically conductive layer and the bottom (Fig. 10, #134) electrically conductive layer, so that the heat (Col. 3, line 3) produced by the electronic component is conducted (see Fig. 7 and Col. 7, line 48) to the top electrically conductive layer and then to

the at least one of the intermediate electrically conductive layer and to the bottom electrically conductive layer, via the first electrically conductive layer (Fig. 1, #160 and Col. 2, lines 17-22). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat-dissipating device of Shin et al. in view of Gohl et al. with that of Brown to couple multiple heat conductor layers to the heat pipe in the through hole to increase the thermal dissipation.

4. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shin et al. (US 6,275,374), in view of Brown (US 4,729,061) and further in view of Roessler et al. (US 6,212,071).

With respect to Claim 8, Shin et al. teaches a heat-dissipating device for dissipating heat produced by at least one electronic component (Fig. 2, #24) of an electronic control device (Fig. 2, #100), wherein the electronic control device includes a circuit board (Fig. 2, #30) having the electronic component mounted thereon, and a protective case (Fig. 2, #84) substantially confining the circuit board, the heat dissipation device comprising: a heat conductive terminal (Fig. 2, #42) connected to the circuit board in a position proximate (see Fig. 2) to the electronic component, so that the heat (Col. 6, lines 44-45) of the electronic component is transferred or conducted to the heat conductive terminal; wherein the heat conductive terminal comprises: a first end portion (Fig. 2, #42 bottom) connected to the protective case in order to thermally conduct the heat to the protective case, and a second end portion (Fig. 2, #42 middle) inserted into an insertion hole (Fig. 2, #30 for #42) formed in the circuit board so as to be

connected to an inner wall (see Fig. 2) of the insertion hole and disposed in close proximity (see Fig. 2) to the electronic component. Shin et al. fails to teach a first and second conductive layers on or within the circuit board. Brown teaches a first conductive layer (Fig. 1, #42) formed on the inner wall of the hole, and second conductive layers (Fig. 1, #112, #132 and #134) including a top conductive layer (Fig. 10, #112), at least one intermediate conductive layer (Fig. 10, #132), and a bottom conductive layer (Fig. 10, #134) disposed on a top surface (Fig. 10, upper part of #100), an intermediate region (Fig. 10, #130), and a bottom surface (Fig. 10, #134) of the circuit board (Fig. 10, #100), respectively, the some of the second conductive layers being connected (see Fig. 10) to the first conductive layer so that heat or electrical signals conducted or transmitted from the electronic component to the second conductive layers is further conducted to either a conductive terminal ((Fig.1, #44) and/or at least one through hole (Fig. 10, #160) formed in the circuit board extending throughout the thickness of the circuit board. While Shin et al in view of Brown fail to show a second set of conductive layers, it would have been obvious to one skilled in the art that the set of conductive layers could be duplicated having one set for heat conduction and the other for electrical conduction. It is been held that duplication of parts is within the ordinary skill of the art. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the device of Shin et al. with that of Brown for the purpose of providing a circuit board with electrical and thermal layers to maximize the dissipation of heat and route the electrical signals

to the desired components. Shin et al. in view of Brown fail to teach that second heat and electrical layers of the circuit board are on the same surface or region and are made of the same material, formed simultaneously with each other, and separated from each other electrically. Roessler et al. teaches wherein the second heat conductive layer (Fig. 1, #28) and the second electrical conductive layer (Fig. 1, #26) disposed on the same surface or region (Col. 2, lines 26-28) of the circuit board (Fig. 1, #12) are made of the same material (Col. 2, line 39, copper), and separated (Col. 2, lines 46-49) from each other electrically. While Roessler teaches that both the electrical and heat conductors are formed during manufacture of the circuit board, it would be obvious that the electrical and heat conductors being on the same material and surface would be formed simultaneously with each other to minimize costs. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the device of Shin et al. in view of Brown with that of Roessler et al. for the purpose of providing a minimizing the cost of fabricating the circuit board by using common materials and manufacturing techniques to produce both the heat and electrical layers in the process.

5. Claims 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shin et al. (US 6,275,374), in view of Gohl et al. (US 4,945,451) and further in view of Roessler et al. (US 6,212,071).

With respect to Claim 14, Shin et al. in view of Gohl et. Al. teach a heat-dissipating device as in claim 1, wherein Shin et al. the protective case (Fig. 2, #80) includes a case body (Fig. 2, #84) and a case cover (Fig. 2, #82) and the

circuit board (Fig. 2, #30) is mounted to and within the case body. Shin et al. in view of Brown does not describe case material. Roessler et al. further teaches wherein the protective case is made of metal (Col. 2, line 61). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat-dissipating device of Shin et al. in view of Brown with that of Roessler et al. to use a metal as a good heat conductive material to dissipate heat away from the electrical components to the outside environment.

With respect to Claim 15, Shin et al. further teaches a heat-dissipating device (Col. 6, line 12).

6. Claims 16 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shin et al. (US 6,275,374), in view of Gohl et al. (US 4,945,451) and further in view of Garrett et al. (US 4,946408).

With respect to Claim 16, Shin et al. teaches a heat-dissipating device for dissipating heat produced by at least one electronic component (Fig. 2, #24) of an electronic control device (Fig. 2, #100), wherein the electronic control device includes a circuit board (Fig. 2, #30) having the electronic component mounted thereon and a protective case (Fig. 2, #84) substantially confining the circuit board, the heat dissipation device comprising: a heat conductive terminal (Fig. 2, #49) connected to the circuit board in a position proximate (see Fig. 2) to the electronic component, so that the heat (Col. 6, lines 44-45) of the electronic component is transferred or conducted to the heat conductive terminal, wherein the heat conductive terminal further comprises a first end portion (Fig. 2, #42 bottom) connected to the protective case in order to thermally conduct the heat to

the protective case, and a second end portion (Fig. 2, #42 middle) inserted into an insertion hole (Fig. 2, #30 for #42) formed in the circuit board so as to be connected to an inner wall of the insertion hole (see Fig. 2). Shin et al. fails to teach a first and second heat conductive layers on or within the circuit board. Gohl et al. teaches a first heat conductive layer (Fig. 1, #Fig. 3, #23) formed on the inner wall of the insertion hole (Fig. 3, #22), and at least one second heat conductive laver (Fig. 3, #25) disposed on or within the circuit board (Fig. 1, #10) and connected to the first heat conductive layer so that the heat conducted or transmitted from the electronic component to the at least one second heat conductive laver is further conducted to the heat conductive terminal (Fig. 1, #21). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat-dissipating device of Shin et al. with that of Gohl et al. to couple multiple heat conductor layers to the maximize the thermal dissipation. Shin et al. in view of Gohl et al. fail to teach the first and second protrusions on the second end portion. Garrett et al. teaches that the second end portion (Fig. 1, #20) further includes; a first protrusion (Fig. 1, #30) contacting a top surface of the circuit board, a second protrusion (Fig. 1, #24) contacting a bottom surface of the circuit board, and wherein the heat conductive terminal is fixed in position (see Fig. 2) relative to the insertion hole via the first and second protrusions, and wherein the second end portion directly contacts (Col. 2, line 40) the a hole in the circuit board wherein the second end directly contacts the first heat conductive layer (Fig. 2, #40); and wherein the first and second projections are made of the same material (Fig. 1, #12) as the second

end portion and are formed integrally (Col. 3, lines 1-2) with the second end portion. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the device of Shin et al. in view of Gohl et al. with that of Garrett et al. for the purpose of minimizing the cost of the terminal by providing a monolithic construction that has opposing protrusions to retain the terminal to a circuit board.

With respect to Claim 21, Shin et al. in view of Brown and further in view of Garrett et al. fail to teach that the first and second projections are formed by bending parts of the second end of the heat conductive terminal. Garrett et al. further teaches that the first and second projections are formed by bending parts (see Fig. 1 and Col. 3, line 2) of the second end portion of the heat conductive terminal. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat-dissipating device of Shin et al. in view of Brown and further in view of Garrett et al. to provide an economical mechanical means to fasten the terminal to the circuit board.

7. Claims 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shin et al. (US 6,275,374), in view of Gohl et al. (US 4,945,451), further in view of Garrett et al. (US 4,946408) and further in view of Brown (US 4,729,061).

With respect to Claim 17, Shin et al. in view of Gohl et al., and further in view of Garrett et al. teach the device of claim 16 above. They fail to teach the layers of the second heat conductive layer. Brown further teaches wherein the at least one second heat conductive layer includes a top (Fig. 10, #112) heat conductive layer, at least one intermediate (Fig. 10, #132) heat conductive layer,

and a bottom (Fig. 10, #134) heat conductive layer, that are disposed on a top surface, an intermediate region, and a bottom surface of the circuit board, respectively. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat-dissipating device of Shin et al. in view of Gohl et al. and further in view of Garrett et al. with that of Brown to couple multiple heat conductor layers to increase the thermal dissipation.

With respect to Claim 18, Gohl further teaches wherein the circuit board further having at least one through hole (Fig. 3, #22) formed in the circuit board (Fig. 1, #10) extending throughout the thickness of the circuit board and disposed in close proximity to the electronic component (see Fig. 2), additionally includes: a first electrical conductive layer (Fig. 3, #15) formed on an inner wall (Fig. 3, #14) of the through-hole. Shin et al. in view of Gohl et al. and further in view of Garrett et al. fail to teach a plurality of second electrical layers. While Brown fails to disclose a second set of conductive layers, it would have been obvious to one skilled in the art that the set of conductive layers could be duplicated having one set for heat conduction and the other for electrical conduction. It is been held that duplication of parts is within the ordinary skill of the art. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960). Brown further teaches a plurality of second electrically conductive layers including a top (Fig. 10, #112 and Col. 4, line 68 layer can be both electrical and thermal) electrically conductive layer, at least one intermediate (Fig. 10, #132 and Col. 4, line 68 layer can be both electrical and thermal) electrically conductive layer, and a bottom (Fig. 10, #134 and Col. 4, line 68 layer can be both electrical and thermal) electrically

conductive layer that are disposed on a top surface, an intermediate region (Fig. 10, #130), and a bottom (Fig. 10, #130) surface of the circuit board, respectively, wherein at least two (see Fig. 10) of the second electrical conductive layers are connected to each other via the first electrically conductive layer. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat-dissipating device of Shin et al. in view of Gohl et al and in further view of Garrett et al. with that of Brown to couple multiple second electrical conductive layers to permit a circuit to fabricated without the addition of jumpers.

With respect to Claim 19, Shin et al. in view of Gohl et al. and further in view of Garrett et al. fail to teach that electrically conductive layers are connected. Brown further teaches wherein the top (Fig. 10, #112) electrically conductive layer is connected to at least one of the intermediate (Fig. 10, #132) electrically conductive layer and the bottom (Fig. 10, #134) electrically conductive layer, so that the heat (Col. 3, line 3) produced by the electronic component is conducted (see Fig. 7 and Col. 7, line 48) to the top electrically conductive layer and then to the at least one of the intermediate electrically conductive layer and to the bottom electrically conductive layer, via the first (Fig. 10, #160) electrically conductive layer. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat-dissipating device of Shin et al. in view of Gohl et al. and further in view of Garrett et al. with Brown to couple multiple heat conductor layers to increase the size of the ground plane and reduce electromagnetic interference.

8. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shin et al. (US 6,275,374), in view of Gohl et al. (US 4,945,451), further in view of Garrett et al. (US 4,946,408), and further in view of Brown (US 4,729,061) as applied to the claims above, and further in view of Roessler et al. (US 6,212,071).

With respect to Claim 20, Shin et al. in view of Gohl et al, further in view of Garrett et al. and further in view of Brown teach a heat-dissipating device as in claims above, wherein the protective case (Shin et al. Fig. 2, #80) includes a case body (Shin et al. Fig. 2, #84) and a case cover (Shin et al. Fig. 2, #82) and the circuit board (Shin et al. Fig. 2, #30) is mounted to and within the case body. Shin et al. in view of Gohl et al, further in view of Garrett et al. and further in view of Brown do not describe case material. Roessler et al. teaches wherein the protective case is made of metal (Col. 2, line 61). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat-dissipating device of Shin et al. in view of Gohl et al., further in view of Garrett et al. and further in view of Brown with that of Roessler et al. to use a metal as a good heat conductive material to dissipate heat away from the electrical components to the outside environment.

Response to Arguments

9. Applicant's arguments with respect to claim 1, 4-8 and 14-20 have been considered but are moot in view of the new ground(s) of rejection mandated by amending the claims. Brown (US 4,729,061) teaches at Col. 4, line 68+ that the layers "provide electrical contact as well as a heat path" and any terminals (#44) connected will transmit both electrical and thermal energy. The applicants'

claims are for an apparatus. In an apparatus claim, the features must be distinguished from the prior art in terms of structure than function. The energy whether electrical or thermal is a function which the same structure can transmit either form of energy as taught by Brown.

It is obvious in Roessler that to minimize costs that both the electrical and thermal conductor paths are "formed by copper in the same manner as circuit paths" and would be etched at the same time to minimize costs.

10. Applicant's amendment to the specification is acceptable.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Ikeda (US 6,501,662) teaches an "L" shaped terminal near an electronic device in proximity on a circuit board.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Robert J. Hoffberg whose telephone number is (571) 272-2761. The examiner can normally be reached on 8:30 AM - 4:30 PM Mon - Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynn D. Feild can be reached on (571) 272-2092. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RJH

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